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Effective Percutaneous Treatment of Type 2 Endoleak via Target Artery Punction Under the Guidance of Fluoroscopy and Ultrasound

Floroskopi ve Ultrasound Rehberliğinde Hedef Arter Ponksiyonu Yoluyla Tip 2 Endoleak'in Etkin Perkütan Tedavisi

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ABSTRACT

Endoleak is a significant complication of endovascular aneurysm repair (EVAR), which can precipitate aneurysm rupture. In addition to interventional radiology clinics, endoleaks are treated by interventional cardiologists and cardiovascular surgeons as well. In this paper, we present a successful repair of a type II endoleak by a cardiology team. A 65-year-old male patient was treated with emergency EVAR due to a ruptured left common iliac artery aneurysm (CIA). After the procedure, control computed tomographic angiography (CTA) revealed a type II endoleak supplied by the left internal iliac artery, and coil embolization was applied. Percutaneous coil and Onyx embolization of endoleak can be safely performed in cardiology clinics by direct puncture of the target vessel under fluoroscopy and ultrasound guidance.

Keywords: Cardiology Clinic; Coil Embolization; Endovascular aneurysm repair; Percutaneous Treatment; Type II Endoleak.

ÖZET

Endoleak, anevrizma rüptürünü hızlandırabilen endovasküler anevrizma onarımı (EVAR) işleminin önemli bir komplikasyonudur. Endoleakler, girişimsel radyoloji kliniklerinin yanı sıra girişimsel kardiyologlar ve kalp-damar cerrahları tarafından da tedavi edilmektedir. Bu yazıda, tip II endoleak'in kardiyoloji ekibi tarafından başarılı bir şekilde onarıldığını sunuyoruz. 65 yaşındaki erkek hasta, sol ana iliak arter anevrizması (CIA) rüptürü nedeniyle acil EVAR ile tedavi edilmiştir. İşlem sonrasında yapılan kontrol bilgisayarlı tomografik anjiyografide (BTA), sol internal iliak arterden beslenen tip II endoleak tespit edildi ve koil embolizasyonu uygulandı. Endoleak'in perkütan koil ve Onyx embolizasyonu, kardiyoloji kliniklerinde floroskopi ve ultrason rehberliğinde hedef damarın doğrudan delinmesiyle güvenle gerçekleştirilebilmektedir.

Anahtar sözcükler: Coil Embolizasyon; Endovasküler anevrizma onarımı; Kardiyoloji Kliniği; Perkütan Tedavi; Tip II Endoleak.

Endoleak is a significant complication of endovascular aneurysm repair (EVAR), which can precipitate the rupture of an aneurysm. Endoleaks are typically treated in interventional radiology clinics. In this report, we present a case of type II endoleak that was successfully

treated by a cardiology team with the contribution of a radiologist. Percutaneous coil and Onyx embolization of the left internal iliac artery were performed through direct puncture of the inferior gluteal artery under fluoroscopy and ultrasound guidance, via a posterior approach.

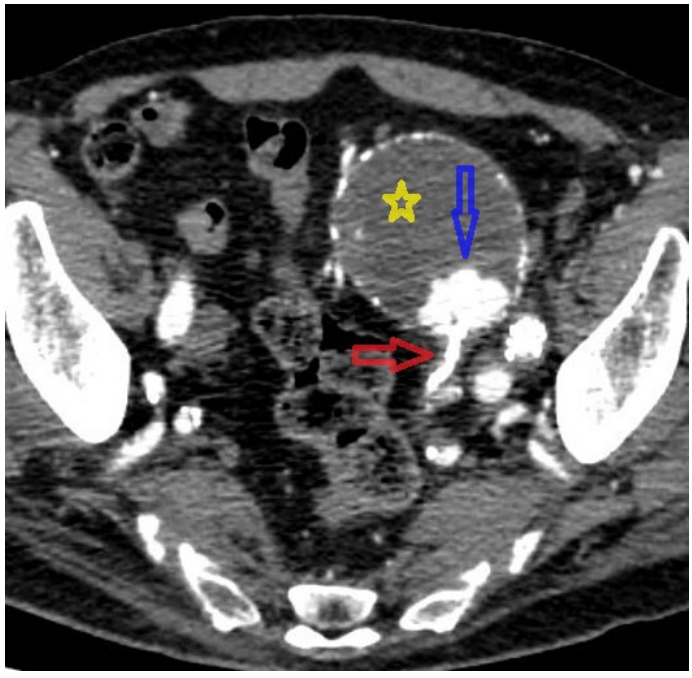

Figure 1. Contrast tomographic angiography shows the aneurysmal sac indicated by a yellow star. The type II endoleak to the aneurysmal sac from the internal iliac artery is highlighted with a blue arrow, red arrow showing the connection between the aneurysmal sac and the internal iliac artery.

Case Report

A 65-year-old male patient was treated with emergency EVAR due to a ruptured left common iliac artery aneurysm (CIA). Control computed tomographic angiography (CTA) following the procedure revealed a type II endoleak supplied by the left internal iliac artery (Fig. 1). The internal iliac artery ostium was aneurysmatic as well, connected with the CIA aneurysmal sac through a narrow neck. It did not thrombose until the follow-up CT performed after six months, and subsequent imaging at one year depicted persistent severe endoleak. Therefore, the patient was scheduled for percutaneous coil embolization of the feeding artery. The patient was positioned in the prone position, and prior to the intervention, the superficial landmark of the entry site was identified. The left greater sciatic notch was marked on the skin surface under fluoroscopy guidance, and about 5 cm inferior and laterally to this first mark, the inferior gluteal artery flow was noticed using Doppler ultrasound (Fig. 2). This second point was considered the entry point. A 10-cm CHIBA biopsy needle was inserted at a 70° angle in a parallel plane to the US-transducer, and consequently, catheterization of the left inferior gluteal artery was achieved at 5-6 cm below

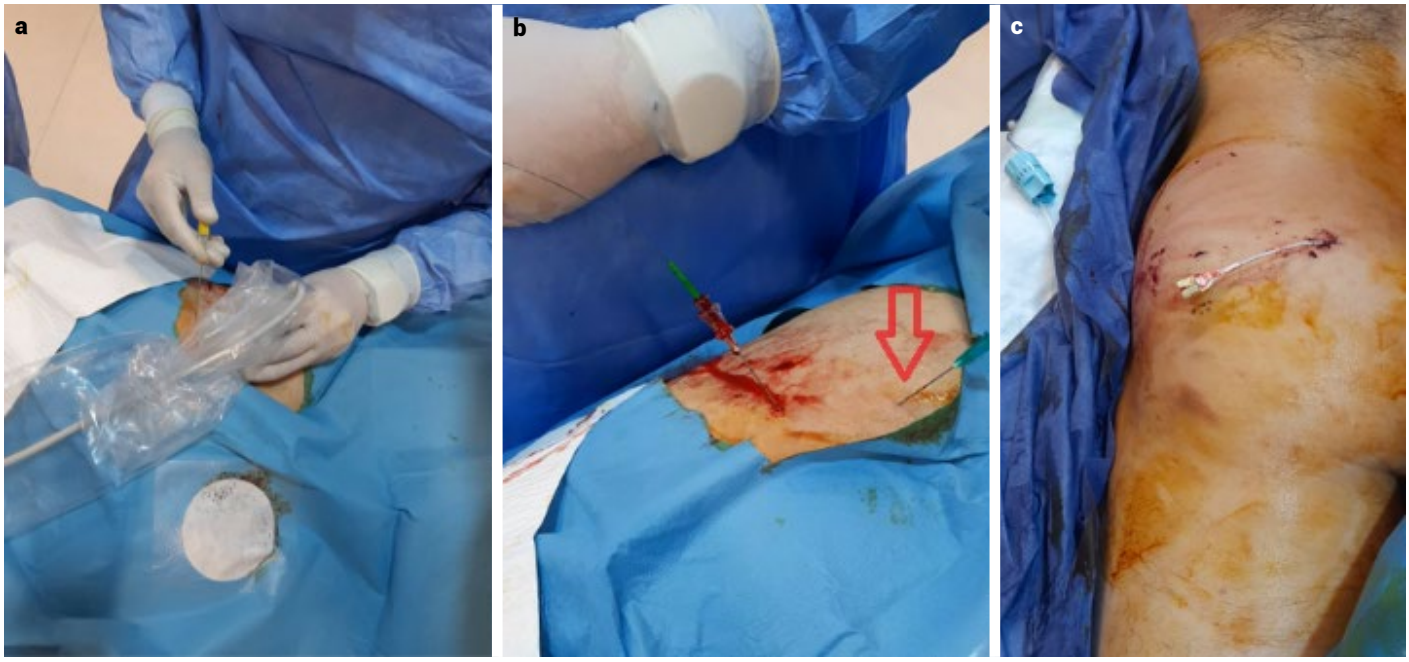

Figure 2. The patient is positioned in the prone position. The left greater sciatic notch is marked on the skin surface under fluoroscopy guidance, indicated by a red arrow, approximately 5 cm inferior and laterally to this first mark where the flow of the inferior gluteal artery was detected using Doppler ultrasound imaging. A 10-cm CHIBA biopsy needle was inserted at a 70° angle in a parallel plane to the ultrasound transducer, achieving canalization of the left inferior gluteal artery at 5-6 cm below the surface.

the surface (Fig. 2). Pulsatile backflow in the needle hub confirmed its tip in the arterial lumen, and a 5 F sheath was then placed. An angiogram was then performed to confirm the trace into the endoleak. Subsequently, a 0.18 guidewire was advanced into the artery lumen, and the needle was then retrieved. After that, the wire tract was dilated, and finally, a flexible access sheath was positioned into the internal iliac artery. Firstly, coils were infused into the neck of the aneurysm through a microcatheter, and subsequently, Onyx was injected to increase the resistance and stabilization of the coils, thus increasing the plug formation. After the procedure, control angiography showed complete occlusion of the inflow to the aneurysm. The sheath was removed one hour after the procedure, and 15 minutes of compression was applied at the entry site while the patient was prone. No bleeding, hematoma, or any neurological complication was observed at the first month outpatient clinic follow-up. Considering the patient's diabetes and mild renal impairment, contrast-enhanced CTA was not deemed appropriate during this early period.

Discussion

Endoleak (blood leakage into an excluded aneurysmal sac after the application of a graft) represents one of the most significant complications of EVAR and occurs in approximately 25% of patients. Five types of endoleaks are defined, with Type II endoleak being the most frequent type, resulting from retrograde blood flow to the aneurysmal sac.[1-3]

There is controversy regarding the ideal treatment strategy for Type II endoleaks. Percutaneous trans-arterial coil embolization of the origin of the feeder artery is a frequently reported method in the repair of Type II endoleak.[2,3] A group of interventional radiologists treated inferior mesenteric artery (IMA) endoleaks using this method. Targets are accessed by selectively catheterizing the superior mesenteric with a 4- or 5-F catheter and advancing a long 3-F microcatheter into the IMA. Once the aneurysm sac is reached and the site of the endoleak confirmed, coils are then infused into the ostium of the IMA.[2-5] Similarly, lumbar arteries endoleaks have been treated, with the advancement of a microcatheter from the hypogastric artery through the iliolumbar arteries to reach the lumbar artery and aneurysm sac.[2,5-7]

Direct puncture of the aneurysm sac via the trans-lumbar approach is also a reported method in the treatment of Type II endoleaks.[1,2,4,8] In this approach, the patient is placed in a prone position, the location of the aneurysm is identified by fluoroscopy and correlation of anatomic landmarks with previous CT imaging, and a route to access the aneurysm through the retroperitoneum is determined. A puncture needle is inserted into the endoleak posteriorly, several centimeters lateral to the midline at the level of the endoleak. Entrance into the endoleak sac will be signaled by the pulsatile return of blood. An angiogram is then performed to confirm entrance into the endoleak. Choi et al.[9] applied the percutaneous transabdominal approach, which is the supine equivalent of the trans-lumbar method in Type II leaks.

Additionally, another center[10] has described a novel method (transcaval) for treating Type II endoleaks, employing an alternative approach through femoral venous access. In this method, the IVC wall is punctured at the level of an aneurysm with a flexible puncture needle within a curved guiding cannula.

In the present case, the wider part of the gluteal artery was not punctured in the greater sciatic foramen region because pelvic organs such as the great sciatic nerve cross from there. Accessing the gluteal artery branches in the greater sciatic foramen could harm pelvic organs. Therefore, puncturing the gluteal artery branches peripheral to the greater sciatic notch and outside the pelvis avoids the risk of injury to pelvic organs that could be associated with direct sac puncture of the internal iliac artery aneurysm.[11]

Considering the deep location of the gluteal arteries, ensuring hemostasis at the access site requires as much attention as puncture. Occlusion of the gluteal artery branches with the StarClose vascular closure system or through embolization of coils, glue, or vascular plugs has been reported.[12] Due to the deep location of the vessel and the lack of a bony structure to which manual compression can be applied, hemostasis by manual compression in the case of large-sized sheaths (6F or larger) cannot be as safe as the previously mentioned methods. In this case, a small-size sheath (5F) was used, so that after the effect of heparin was neutralized, we successfully achieved hemostasis by 15 minutes of manual compression followed by sitting the patient on their hip.

Conclusion

Percutaneous coil and Onyx embolization of endoleak can be safely performed in cardiology clinics through direct puncture of the target vessel under fluoroscopy and ultrasound guidance.

Disclosures

Informed consent: Written informed consent was obtained from the patient for the publication of this case report.

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References

1. Grande W, Stavropoulos SW. Treatment of complications following endovascular repair of abdominal aortic aneurysms. Semin intervent Radiol 2006;23:156–64.
2. Becquemin JP, Kelley L, Zubilewicz T, Desgranges P, Lapeyre M, Kobeiter H. Outcomes of secondary interventions after abdominal aortic aneurysm endovascular repair. J Vasc Surg 2004;39:298–305.
3. Stavropoulos SW, Clark TW, Carpenter JP, Fairman RM, Litt H, Velazquez OC, et al. Use of CT angiography to classify endoleaks after endovascular repair of abdominal aortic aneurysms. J Vasc Interv Radiol 2005;16:663–7.
4. Baum RA, Carpenter JP, Golden MA, Velazquez OC, Clark TW, Stavropoulos SW, et al. Treatment of type 2 endoleaks after endovascular repair of abdominal aortic aneurysms: Comparison of transarterial and translumbar techniques. J Vasc Surg 2002;35:23–9.
5. Görich J, Rilinger N, Sokiranski R, Krämer SC, Ermis C, Schütz A, et al. Treatment of leaks after endovascular repair of aortic aneurysms. Radiology 2000;215:414–20.
6. May J, White GH, Waugh R, Petrasek P, Chaufour X, Arulchelvam M, et al. Life-table analysis of primary and assisted success following endoluminal repair of abdominal aortic aneurysms: The role of supplementary endovascular intervention in improving outcome. Eur J Vasc Endovasc Surg 2000;19:648–55.
7. Faries PL, Cadot H, Agarwal G, Kent KC, Hollier LH, Marin ML. Management of endoleak after endovascular aneurysm repair: Cuffs, coils, and conversion. J Vasc Surg 2003;37:1155–61.
8. Baum RA, Cope C, Fairman RM, Carpenter JP. Translumbar embolization of type 2 endoleaks after endovascular repair of abdominal aortic aneurysms. J Vasc Interv Radiol 2001;12:111–6.
9. Choi SY, Won JY, Lee DY, Choi D, Shim WH, Lee KH. Percutaneous transabdominal approach for the treatment of endoleaks after endovascular repair of infrarenal abdominal aortic aneurysm. Korean J Radiol 2010;11:107–14.
10. Mansueto G, Cenzi D, D'Onofrio M, Petrella E, Gumbs AA, Mucelli RP. Treatment of type II endoleaks after endovascular repair of abdominal aortic aneurysms: Transcaval approach. Cardiovasc Intervent Radiol 2005;28:641–5.
11. Kabutey NK, Siracuse JJ, Gill H, Kundi R, Meltzer AJ, Schneider DB. Percutaneous transgluteal coil embolization of bilateral internal iliac artery aneurysms via direct superior gluteal artery access. J Vasc Surg 2014;60:226–9.
12. Norris E, Bronzo B, Olorunsola O. Off label use of starclose for superior gluteal artery puncture closure following embolisation of an internal iliac artery type II endoleak. EJVES Vasc Forum 2021;51:1–4.